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July 29, 2010

Via Electronic Mail

Mr. Carl Bauer
Retired Director of National Energy Technology Laboratory
Chairman of CCS Review Panel

Re: Hydrogen Energy California LLC Submissions to California CCS Review Panel

Dear Mr. Bauer:

Initially, Hydrogen Energy California LLC ("HECA") would like to express its gratitude for the tremendous work and effort of the California Carbon Capture and Storage Review Panel (the "Panel") in addressing the varied and complex issues surrounding CCS. The State of California has recognized that CCS may play a critical role in the State's greenhouse gas reduction goals. Furthermore, to enable the deployment of CCS, this Panel has been charged with making recommendations to establish a clear and consistent policy framework defining the authorities and roles of various state agencies, facilitating and streamlining the permitting process and serving the public interest by ensuring that climate change mitigation goals are met in a manner that is protective of the environment and human health and safety. We have appreciated the opportunity to participate and provide input to the Panel in connection with this work.

As we recently presented to the Panel at the June 2 Workshop, HECA is developing an integrated gasification combined cycle ("IGCC") power generating facility in Kern County, California, that will provide low-carbon baseload power by capturing approximately 90% of the potential CO_2 emissions from the raw synthesis gas that is produced during steady state operations (approximately 2.2 million tons per year). The captured CO_2 will be compressed and transported to Occidental of Elk Hills ("OEHI") for use in its enhanced oil recovery ("EOR") operations, resulting in sequestration of the CO_2 ("Oxy CO_2 EOR Project"). In connection with developing the Project, HECA has analyzed and worked on many of the complex topics surrounding CCS both on the federal and state level.

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We respectfully submit for the Panel's consideration the following papers:

(1) Summary of the proposed Permitting Structure for the HECA Project: Existing California law provides the framework for permitting of the HECA and Oxy Projects. This paper sets forth the legal framework for permitting of the projects (see Attachment 1).

(2) Need for Encouragement of CCS and low-carbon power policy in the State of California: California needs to adopt low carbon power policy in order to meet its GHG reduction goals. This paper discusses this need and suggests alternatives for implementing a low carbon power generation policy (see Attachment 2).

(3) Summary of Incentives for CCS Deployment in Climate Legislation: The federal government is proposing various incentives to encourage private investment and development of CCS projects in comprehensive climate legislation. This paper summarizes the current proposals in the House and the Senate (see Attachment 3).

(4) Summary of Federal Proposals for Long-Term Stewardship and Long-Term Liability for Geologic Storage Facilities: There are several legislative proposals on the federal level to address the long-term stewardship and liability issues associated with CCS projects. This paper summarizes several of the key proposals (see Attachment 4).

We hope this information will be useful to the Panel. HECA would be happy to answer or provide any further information regarding the foregoing. Please do not hesitate to contact me with any questions or requests for further information.

Very truly yours,

Tiffany Rau

Tiffany Rau
Policy & Communications Manager

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ATTACHMENT 1

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Summary of Permitting Structure for the HECA Project

A. Introduction

The Hydrogen Energy California ("HECA") project will provide low-carbon baseload power by capturing approximately 90% of the potential CO_2 emissions from the raw synthesis gas that is produced during steady state operations (approximately 2.2 million tons per year) from its proposed integrated gasification combined cycle ("IGCC") power generating facility in Kern County, California. The captured CO_2 will be compressed and transported to Occidental of Elk Hills ("OEHI") for use in its enhanced oil recovery ("EOR") operations, resulting in sequestration of the CO_2 ("Oxy CO_2 EOR Project").

OEHI operates a large, mature oil production field in the Elk Hills Unit near Bakersfield, California (approximately 4 miles from the HECA project site) and is proposing to extend existing EOR operations at the Elk Hills Unit by using CO_2 from the HECA project to facilitate existing oil production. The EOR process using CO_2 as an injectant results in sequestration of the injected CO_2. In the Oxy CO_2 EOR Project, CO_2 and hydrocarbon gas will be separated from the produced oil and water at the surface and re-injected into the reservoir using a closed-loop operating system so that recovered CO_2 is not released to the atmosphere. With each pass of the CO_2 stream through the oil reservoir, a significant portion of the injected CO_2 will become trapped in the reservoir; researchers from the University of Wyoming's Enhanced Oil Recovery Institute estimate that the amount trapped *during each cycle* can be roughly one third of the injected CO_2.[1] The balance of CO_2 will be recovered, recycled, and blended with additional CO_2 purchased from the HECA Project before being re-injected. Ultimately, all of the injected CO_2 (net of de minimis fugitive and operational emissions) will become trapped in the formation, primarily by the natural geographic features of the site, and will be sequestered.

As further explained below, HECA and OEHI have proposed a permitting structure to the California Energy Commission (CEC) and the Department of Conservation, Division of Oil, Gas & Geothermal Resources (DOGGR), under existing California law and Class II UIC Regulations that provides the permitting framework necessary to lawfully permit HECA's IGCC with carbon capture and sequestration (CCS) project.

[1] EORI, University of Wyoming, "New Thinking," accessed online June 2010 at: http://eori.uwyo.edu/downloads/CO2_EOR.pdf.

The HECA Project has submitted an application for certification (“AFC”) for the HECA Project to the CEC, responded to over 150 Data Requests, and participated in two workshops on the Project. OEHI has submitted its CO_2 EOR Preliminary Project Description (Pre-FEED Stage), responses to CEC Staff’s subsurface-related questions raised in correspondence from CEC dated March 4, 2010, a sample Class II UIC Permit Application, and reports of technical studies and academic white papers analyzing the potential for CO_2 EOR as a form of sequestration. A draft proposed monitoring, reporting and verification (MRV) protocol developed by OEHI with input from third-party environmental stakeholders has been provided to the CEC. These submissions, together with additional information that may be requested by CEC Staff, will allow CEC Staff to complete its review of the HECA Project and the Oxy CO_2 EOR Project.

B. <u>**Existing Legal Authority Provides a Suitable and Efficient Framework For Permitting the HECA Project and the Oxy CO2 EOR Project.**</u>

Pursuant to the Warren-Alquist Act provisions in the Public Resources Code (section 25000, et seq.), the HECA project can be fully authorized through the facility siting application process currently pending before the CEC. The siting process and the California Environmental Quality Act ("CEQA") require the CEC to consider all potentially significant environmental impacts of the "whole of the project," which includes potentially significant impacts from the Oxy CO_2 EOR project. CO_2 sequestration is an integral element of the HECA project.

To ensure that there are no unmitigated significant impacts, the CEC siting process will identify project design features and mitigation measures intended to eliminate or mitigate any such potential impacts. To the extent that the CEC identifies potentially significant impacts from the Oxy CO_2 EOR project as it relates to the HECA project, including any impacts relating to the sequestration of the CO_2, the CEC can also specify as conditions of certification of the HECA project additional project design features or mitigation measures that should be implemented by other agencies responsible for permitting the Oxy CO_2 EOR Project. Such additional requirements would include, for example, additional measuring, reporting, verification, or closure standards that the CEC - in consultation with other responsible agencies - deems necessary and appropriate to meet the environmental and other objectives of the HECA project or mitigate any potentially significant impacts of the Oxy CO_2 EOR Project.

When the HECA project is certified, or nearing certification, under the Siting Process, Oxy would submit applications for the Oxy CO_2 EOR Project to all appropriate agencies. Any mitigation measures applicable to the Oxy CO_2 EOR

Project that the CEC identified as conditions to the certification of the HECA project would be included in permits issued by agencies responsible for permitting related elements of the Oxy CO_2 EOR Project; this would include, for example, any measuring, reporting, verification or closure standards relating to Class II well permits issued by DOGGR. As more fully described in the authority discussion below, we believe DOGGR is fully authorized to issue Class II UIC permits for the Oxy CO_2 EOR Project and incorporate all appropriate requirements specified by the CEC pursuant to the Siting Process.

C. Summary of DOGGR Permitting Authority Over the OXY CO_2 EOR Project

The Federal Clean Water Act, California Public Resources Code ("PRC") and DOGGR regulations provide clear authority for DOGGR to permit injection and extraction wells and associated well facilities for the purpose of injecting fluids and gases, including CO_2, for EOR. Underground injection wells for EOR, including CO_2 EOR, are regulated pursuant to the U.S. EPA Underground Injection Control program as Class II wells.[2] Pursuant to the federal UIC program, CO_2 EOR has been permitted under Class II in California and other states for many decades, and EPA has clearly stated that CO_2 injection for EOR will continue to be permitted under Class II despite any additional rulemaking relating to CO_2 sequestration. EPA guidance further supports California's authority for regulation of these activities.

In the case of the prospective Oxy CO_2 EOR Project, DOGGR will be permitting the injection of CO_2 for the purpose of EOR. By virtue of the EOR process, the inherent physical and chemical processes naturally result in sequestration of the injected CO_2. Although Oxy's Class II permit application to DOGGR may include certain features relating to the demonstration of sequestration, the inclusion of those features does not alter DOGGR's discretionary authority to issue the Class II UIC permit for EOR. Rather, under the Warren-Alquist Act,[3] DOGGR would be obligated to consider the features proposed by Oxy and any other design features or mitigation measures relating to the Oxy CO_2 EOR Project that were identified by the CEC in the certification of the HECA project.

Enhanced oil recovery using CO_2 is widely recognized as the best platform for the early demonstration of commercial-scale carbon capture and sequestration. Class

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[2] The U.S. E.P.A. has delegated to DOGGR authority to oversee the Class II UIC program.

[3] Under the Warren-Alquist Act, the CEC's issuance of power plant licenses is a "certified regulatory program" for the purposes of CEQA. 14 Cal. Code Regs. § 15251 (j).

II has long been used to permit projects injecting CO_2 for purposes of EOR. Class II permitting by DOGGR, as supplemented by additional CEC-identified mitigation measures, represents the most sensible regulatory framework to regulate the injection of CO_2 for purposes of EOR and verifying sequestration given DOGGR's existing regulations for and expertise in the injection of fluids for EOR. Finally, DOGGR's regulation of the Oxy CO_2 EOR Project is entirely consistent with the agency's mandate to increase the recovery of oil and gas resources within the state.[4] CO_2 injection for EOR is a proven method for enhancing oil and gas recovery, and CO_2 has become a valuable commodity for this purpose resulting in increased demand for CO_2 for EOR. DOGGR's regulation of the Oxy CO_2 EOR Project under Class II permitting will facilitate the economical use of CO_2 to advance oil recovery within the state, thus, advancing its mandate. (For a more detailed analysis of DOGGR's legal authority to permit the Oxy CO2 project, please see attached Legal Memorandum on this subject as Attachment 5.)

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[4] *See, e.g.*, Cal. Pub. Res. Code § 3106(a) (establishing DOGGR's environmental protection authority by mandating the supervisor to "supervise the drilling, operation, maintenance, and abandonment of wells … *so as to prevent, as far as possible, damage to life, health, property, and natural resources*….") (emphasis added), § 3106(b) (authorizing DOGGR "to permit the owners or operators of the wells to utilize *all methods and practices known to the oil industry for the purpose of increasing the ultimate recovery of underground hydrocarbons*…. including, but not limited to, the injection of air, gas, water, or other fluids into the productive strata…") (emphasis added), § 3013 (stating that the Oil and Gas division of the PRC "*shall be liberally construed to meet its purposes*, and the director and the supervisor, acting with the approval of the director, shall have all powers, including the authority to adopt rules and regulations, which may be necessary to carry out the purposes of this division.") (emphasis added); Cal. Code Regs. Tit. 14, Subchapter 2 (Environmental Protection), § 1779 ("The Supervisor in individual cases may set forth other requirements where justified or called for.")

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ATTACHMENT 2

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How can California encourage carbon capture and storage (CCS), and low carbon power generation?

Public policy initiatives which acknowledge low carbon power's important role in reducing GHG's have moved through the State's executive branch, legislature and numerous state regulatory agencies. These past efforts have established the basis for further enabling policy.

- Executive Orders S-3-05 and S-7-04 called for the investigation and development of low-carbon electricity.

- Assembly Bill (AB) 32 directed the California Energy Commission (CEC) and the California Public Utilities Commission (CPUC) to develop specific GHG emission reduction targets in the electricity sector.

- AB 1925 required the CEC to investigate adoption of cost effective geologic carbon sequestration strategies.

- Senate Bill (SB) 1368 clarified that CO2 sequestered in geologic formations by a power project counts as CO2 emission reductions. It also established a low carbon emission performance standard for base-load power plants, allowing for cost recovery of utility participation in, or purchases from, low carbon power projects.

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Building upon these initial public policies and the precedence established by the creation of a set aside for renewable energy resources --the RPS --California as a leader in addressing climate change has the opportunity to pursue several public policy alternatives that can encourage low carbon power technology development, and achieve significant reductions in CO2 emissions from existing and future power generation not covered by the 20 -33% RPS requirement.

Following the legislative intent of SB 1368, above, for example, further public policy could further define "low carbon power" by establishing graduated thresholds for CO2 emission reductions (pounds of CO2 emitted per megawatt hour) for power generating projects. Another approach taken by other states is to require an increasing percentage of captured CO2 emissions over time (i.e. 40% CO2 capture in 3 years, 60% capture in 6 years, 90% by year 10) from power generation projects.

In each case the purpose of defining "low carbon power" is to both encourage the development of low carbon power generation projects, as well as to require energy utilities to invest in, or purchase a percentage of its power from, low carbon power projects, as defined.

Another approach may flow from the requirements of AB 32 directing the CPUC to establish GHG reduction targets in the electricity sector, combined with the language of SB 1368 allowing for cost recovery of low carbon power. Legislation or regulation could encourage or require state energy utility investment in low carbon power, defined at certain thresholds as above, or specifically provide for rate recovery of such investment, or of power purchases from such low carbon power facilities, as defined.

Further, a low carbon power set-aside, a precedent established for renewable energy resources, could be established for low carbon power resources, as defined above. This would not replace or compete with any requirement contained in the current RPS; but instead would be an additional requirement, an incremental increase in the ability to achieve CO2 emission reductions from electric generation resources not covered by the RPS. Some states, for example, have considered legislation establishing a 3-5 % set aside, a requirement that the state's energy utilities' power procurement portfolio include 3-5 % of power generated from low carbon resources, as defined.

Adopting a “Low Carbon” category within the Loading Order to support utility contracting with low GHG emissions resources would establish broad policy support for carbon capture and storage project in the power sector. The policy could be strengthened through the creation of a Low Carbon Portfolio Standard, which would work in conjunction with the current Renewable Portfolio Standard (RPS) to assure further reductions in GHG emissions in the utility portfolios.

These public policies --policies critically needed in California --are designed to push the development of low carbon power generation projects --and to achieve a greater share of CO2 emission reductions from the share of power generation that is not covered by an RPS. California should not ignore the opportunity to further reduce CO2 emissions from all the electric generation resources in addition to the reductions arising from a RPS; without a “low carbon” category, CO2 emissions that otherwise could be reduced, remain being emitted continuously into the atmosphere.

For an analysis of the importance of CCS to meeting California's long-term target for reducing GHG emissions in the power sector, please see “Meeting California's Long-Term Greenhouse Gas Reduction Goals" at ethree.com. The seminal study includes several projections of California's energy use and GHG emissions through the year 2050, concluding that California cannot meet its long-term targets without deploying CCS and producing low carbon power.

ATTACHMENT 3

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Summary of Incentives for CCS Deployment in Climate Legislation

In recognition of the critical need for the timely commercial deployment of CCS, Congress is embracing proposals that would provide significant incentives to "early mover" CCS projects. Every comprehensive climate policy bill has included provisions to create a program for direct cash payment for sequestered CO_2 from fossil fuels in both power generation and certain industrial operations. As proposed, the payments will be on a first-come-first-serve basis for the first ten years of operation. The payments will be structured using a sliding scale payment per ton of CO_2 sequestered, based on the level of capture achieved. Payment levels should be adequate to cover the incremental cost of CCS, which is currently estimated to be $90/ton for high levels of capture at the first few projects. In addition there will likely be a provision for a floor payment of up to the $30 per ton in years 11-20, depending on the level of capture achieved.

As proposed, the program would be divided into tranches of generating capacity, with an initial tranche of 6-10 GW at the highest payment level, with successive tranches receiving lower per-ton payments. Eligibility for payments would terminate for CCS projects commencing operation after on the order of 72 GW of CCS have been deployed in the United States. This is intended to encourage early action to deploy CCS.

Following is a summary of the early mover CCS incentive programs contained in the current House and Senate climate legislation that would be used to <u>lower the cost of low carbon electricity for the ratepayer</u>.

American Clean Energy and Security Act: (Waxman/Markey, passed House, June 26, 2009) For early movers (first 6 GW): bonus allowances value equals $90/ton at 85% capture; for projects online before January 1, 2017 (and that the Administrator knows about by January 1, 2012). Expressly includes CO_2 injection for EOR with storage, with an adjustment determined by the Administrator of U.S. EPA, and a sliding scale so that projects that capture and sequester less than 85% would receive lower payment.

American Power Act: (Kerry-Lieberman, introduced in the Senate, May 12, 2010) First 10 GW of capacity: bonus allowances will equal $96/ton for 90% capture and sequestration with a sliding scale for projects that capture less CO_2 receiving lower payment. Expressly includes CO_2 injection for EOR with storage, with an adjustment determined by the Administrator of U.S. EPA. For plants achieving at least 50% capture no later than January 1, 2017 (and that the Administrator knows about by January 1, 2012), the bonus allowance value is increased by $10 above the applicable bonus allowance value.

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ATTACHMENT 4

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<u>Summary of Federal Proposals For</u>
<u>Long-Term Stewardship and Liability for Geologic Storage Facilities</u>

There are currently a number of statutory proposals to establish a Federal framework for management of long-term stewardship and long-term liability for carbon dioxide ("CO_2") geologic storage ("GS") facilities. These proposals vary, but generally address issues such as operational phase requirements, fees, closure certification requirements, transfer of long-term stewardship to a governmental entity, limits on long-term liability, and establishment and operation of a Federal Trust Fund for claims and remediation. A number of states have enacted legislation addressing some of these issues using a variety approaches. The enactment of a federal scheme is preferable because it would enable comprehensive and consistent treatment of the long-term stewardship and liability issues associated with carbon, capture and sequestration (CCS) projects. Furthermore, these issues should be addressed at the federal level due to the nature and purpose of geologic storage of CO_2. A federal uniform approach will advance the rapid deployment of large-scale CCS projects, prevent forum shopping that may otherwise arise if a patchwork of state schemes develop, and allow the pooling of resources to address funding concerns.

Carbon Storage Stewardship Trust Fund Act of 2009
<u>S. 1502-Senators Casey (D-PA) and Enzi (R-WY) (the "Casey-Enzi Proposal")</u>

The Casey-Enzi Proposal would require the project operator to have private liability assurance during the active project period until issuance of a certificate of closure. However, this measure provides flexibility by allowing a number of privately funded financial mechanisms including self insurance, third-party insurance, bonds, trust funds or letters of credit. Each GS facility would also be required to pay a risk-based fee for each ton of CO_2 injected into the GS unit during the operational phase. The assessment may be made based on the level of risk associated with a *specific* GS unit, thus, providing an incentive for selection and operation of the best CO_2 storage facilities.

A certificate of closure would require a determination by the Administrator of the Environmental Protection Agency or another Federal or State regulatory authority certifying that the project operator has met the closure requirements. This measure provides for the transfer of long-term stewardship to the Federal government after a certificate of closure has been issued. The Federal government would then be responsible for measurement, monitoring and verification ("MMV") and remediation. Alternatively, the measure provides that management responsibilities for long-term stewardship may be transferred to the State upon the State's request and Secretary of Energy's ("Secretary") approval.

After the site has received a certificate of closure, the measure provides that no civil claims may be made against the owner or operator of the facility, the generator of CO_2, or the transmission pipeline except for gross negligence or intentional misconduct, and thereby provides certainty to private entities regarding future liability post-closure absent gross negligence or intentional misconduct. This includes claims for harm or damage to persons, property or natural resources. A Federal Trust Fund financed by operator fees would pay for civil claims arising after a certificate of closure is issued, long-term stewardship costs, and administrative costs in carrying out the program. The measure provides for a limit on the amount of an aggregate claim paid out of the Trust Fund, but Congress may provide for payment in excess of the limit.

American Clean Energy Leadership Act of 2009
S. 1462-Subtitle F- Carbon Capture

This measure would create a program providing financial and technical assistance for up to 10 large-scale (injection of over 1 million tons of CO_2 per year from industrial sources) CO_2 GS demonstration projects chosen by the Secretary through a competitive selection.

The demonstration projects would be required to comply with any terms and conditions the Secretary includes in a cooperative agreement including all applicable laws and regulations and other MMV and closure requirements. Projects would be required to maintain financial assurances in the *form* and amount approved by the specified government agency (unlike the multiple options in the Casey-Enzi Proposal) during the post-injection closure and monitoring phase until a certificate of closure is issued. The measure establishes closure requirements that are prerequisites for long-term stewardship to transfer to the Federal government. However, this measure does not allow the transfer to occur until certain science-based criteria have been met for 10 years beginning after the CO_2 plume has stabilized within the geologic formation.

These projects would be required to pay a fee, which would be established by the Secretary through regulation. After issuance of a certificate of closure, the Secretary is authorized to take title to lands containing closed demonstration project GS sites for long-term stewardship.

The Secretary is authorized to indemnify the demonstration projects for legal liability for personal, property and natural resources damage in excess of the financial protection the project is required to maintain. This indemnity excludes the project operator’s intentional misconduct or gross negligence. Indemnification for each demonstration project would be capped at $10 billion.

Southern Company, Environmental Defense Fund, Duke Energy and Zurich Proposal

This proposal provides for cooperative agreements with the Secretary to provide financial assistance for liability with a ceiling. The program would be limited to "pioneer" projects, those that obtain all permits and authorizations before the Secretary certifies that the CO_2 generated by the equivalent of up to 40 GW of electric generating capacity is being injected for GS in the United States.

Cooperative agreement recipients would be required to pay into a Carbon Sequestration Maintenance Trust Fund to cover post-closure infrastructure maintenance and MMV costs. The Carbon Sequestration Maintenance Authority ("CSMA"), an independent public benefit corporation, would determine the fee, which would be assessed per ton of CO_2 injected. Entities that opt out of long-term assistance would pay the fee at a lower rate that would be no more than 20 percent of the fee otherwise established. In addition to the fee, cooperative agreement recipients would all be responsible (until certificate of closure is issued for the project) for industry pool liability that is apportioned on a pro rata basis to each recipient for a maximum of $12.5 million per occurrence for each recipient. All GS facilities (with a cooperative agreement or otherwise) would be required to pay a 5 to 10 cent fee per ton of CO_2 injected to cover remediation, infrastructure maintenance and MMV for orphan sites (where no responsible entity remains).

This proposal establishes a layered risk management program where the first layer of liability is with the GS facility, the second layer is with the industry pool, and the third layer is with the government. When the liability exceeds the caps for every one of these first three layers, the liability would revert back to the site operator. Under this proposal, the site would always be covered under the four layers of liability (both during project phase and long-term stewardship), thus the project owner/operator would always be subject to liability. The government would not indemnify for liability arising out of reckless or intentional misconduct on the part of the recipient.

In addition to the layers of liability, the proposal establishes greater financial assistance for earlier projects by establishing three groups of GS installations based on how early a project was proposed. The first group has the lowest limit on the site's initial layer of liability and the limits increase for the other two groups ($50-,$100- and $200 million). Additionally, the first group has the highest limit on the government's liability and the limits decrease for the other two groups ($900-, $600- or $300 million). After site closure, the CSMA would dispense funds from the Trust Fund to the Secretary to provide infrastructure maintenance and MMV.

American Electric Power/National Mining Association/Peabody/Shell
6/23/2010 Discussion Draft

The AEP proposal has been modified over a period of months. The most recent proposal builds on the initial proposal, but adds a provision for "pioneer" facilities that is similar to the Southern Company/EDF proposal.

First Movers: The proposal authorizes indemnification agreements for "first mover projects," which would be10 large-scale CO_2 GS projects chosen through competitive selection. The Secretary is authorized to enter into indemnification agreements with these demonstration projects for all or part of costs incurred to satisfy remediation and civil claims (whenever they are made) provided that the owners/operators maintain financial protection in a form and amount acceptable to the Secretary. The indemnification would cover the excess of the amount of financial protection maintained by the project. The Secretary would be authorized to impose conditions on indemnification agreements.

Pioneer GS Facilities: The proposal also includes a "Risk Management Program" for pioneer GS facilities resembling the Southern Company/EDF proposal. The Secretary may enter into cooperative agreements with pioneer facilities, which are GS facilities that enter into cooperative agreements with the Secretary and obtain approvals for operation before the Secretary certifies that 320 million tons per year of CO_2 is being injected for GS in the United States.

The individual project would have the first layer of liability for *pre closure certificate* occurrences up to a cap that depends on how early it enters into a cooperative agreement (there are three groups similar to the Southern Company/EDF proposal). The project would also have *pre-closure* industry pooling obligations similar to the Southern Company/EDF proposal. The financial indemnity from the Secretary would be limited to $900-, $600- or $300 million depending on when the project enters into the agreement. Liability exceeding this amount would be paid by the GS pioneer project if it arises during the operation and post-injection periods and from the Trust Fund it if arises during the stewardship period. If the Trust Fund does not have sufficient funds, the recipient would be liable for the excess. Pioneer projects would be required to pay a risk-based fee to the trust fund, and entities that opt out of long-term assistance would pay the fee at a lower rate that would be no more than 20 percent of the fee otherwise established.

Other GS Facilities: Other GS facilities would be required to pay a risk-based fee assessed per ton of CO_2 injected during the operational phase to finance the Trust Fund. The post-closure limit on liability is different than the original AEP proposal. In this version, the project operator would be liable for public claims and remediation costs for 20 years after the certificate of closure is issued subject to a limit of $25 million per occurrence. Claims and remediation costs in excess of that amount would be paid from the Trust Fund, but if a claim is in excess of Trust Fund resources, the operator would be liable for the amount in excess. Additionally, the property owner, holder of real property interest, transmission pipeline or the generator of CO_2 would be shielded from liability. Significantly, this proposal provides a broader definition of "public claim" than the initial AEP proposal-- it includes claims for injury or harm to persons, property or natural resources. Indemnity does *not* cover claims involving the operator's willful violation of regulatory requirements, false statements in an application for a certificate of closure, or reckless or intentional misconduct.

A certificate of completion would be issued at the end of the post-injection phase if the regulatory authority determines and certifies that the operator has met the applicable requirements. Unlike the initial AEP proposal, this draft adds a requirement that an independent board make a separate determination of closure after the issuance of the certificate and allows for notice and comment in this process. States may assume the lead role for long-term stewardship in accordance with the Secretary's regulations, but the Federal government would fill the gap if states elect not to do so. The stewardship agency would be subject to injunctive relief for performance of stewardship responsibilities, but the agency would not be subject to civil claims for its assuming or carrying out stewardship responsibilities except for reckless or intentional misconduct.

The Trust Fund would be administered by an independent board and would be used to pay public claims, as well as monitoring and remediation costs. Public claims paid out of the Trust Fund would be adjudicated by an administrative law court within an Office of Public Claims. This proposal provides that the Trust Fund may be used to reimburse monitoring and remediation costs for orphan storage facilities if certain requirements are met.

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ATTACHMENT 5

Summary of DOGGR Authority to Permit the OXY CO_2 Project

Occidental of Elk Hills, Inc (Oxy). is proposing an enhanced oil recovery project (EOR) utilizing as one of the injectant fluids carbon dioxide ("CO_2") produced from a power generation facility proposed by Hydrogen Energy California LLC ("HECA"). The California Department of Conservation, Division of Oil, Gas & Geothermal Resources ("DOGGR") seeks clarification of its authority to regulate Oxy's proposed CO2 EOR project ("OXY CO_2 Project"). This summary legal analysis affirms: (1) DOGGR's authority to issue Class II underground injection control ("UIC") permits for Oxy's CO_2 Project; (2) that DOGGR's UIC program provides the appropriate regulatory framework for any additional permitting criteria necessary or desirable to assure that CO_2 injected for EOR is concurrently sequestered; and (3) that such actions are consistent with DOGGR's statutory mandate to increase oil and gas resources in the state.

I. PROJECT BACKGROUND

The HECA project involves the capture of CO_2 from an integrated gasification combined cycle power generating facility and the compression and transport of the CO_2 to the nearby Elk Hills Oil Field Unit for use in CO_2 EOR. The CO_2 EOR process will improve oil recovery at the Elk Hills Oil Field Unit through the use of a closed-loop system involving surface and subsurface facilities for injection, production, processing, separation, compression and reinjection of CO_2. The injected CO_2 – which is in a "supercritical" fluid state – reduces the viscosity and enhances mobility of oil to improve extraction. CO_2 is not emitted into the atmosphere during the CO_2 EOR process or after operations cease, other than de minimis fugitive losses from equipment. Injected CO_2 becomes sequestered in pore space voided by oil and other fluids or gasses produced in the EOR operation, as well as through other geochemical trapping mechanisms.

During the operational phase of an EOR operation, some volume of injected CO_2 is extracted (along with hydrocarbons and other gases and fluids) through production wells. Injected CO_2 that is subsequently extracted remains a valuable commodity and is not vented to the atmosphere. Instead, using a closed-loop system, it is separated from the hydrocarbons, other gasses and fluids, and then reinjected for additional EOR use. With every injection cycle 40-60 percent of the injected CO_2 volume becomes sequestered in the formation, making it unrecoverable regardless of the intent of the operator to store or produce the CO_2. The irreversible trapping effect is an unavoidable characteristic of the CO_2 EOR process, one that creates a persistent demand for additional CO_2 over the course of the EOR operation. This predictable demand and geologic permanence is why CO_2 EOR is an ideal technology for sequestering CO_2 emissions.

II. DOGGR'S AUTHORITY TO REGULATE THE OXY CO_2 PROJECT

California Public Resources Code ("PRC") and DOGGR regulations provide authority for DOGGR to permit injection and extraction wells and associated well facilities for the purpose of injecting fluids and gases, including CO_2, for EOR.[1] The federal UIC Program has been

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[1] *See generally* Cal. Pub. Res. Code Division 3, Chapter 1 and 14 Cal. Code Regs. Division 2.

implemented since 1980 and has responsibility for managing over 800,000 injection wells. California has been delegated authority to implement the federal UIC program since approximately 1981. The programmatic components of the UIC Program are designed to prevent fluid movement into underground sources of drinking water ("USDWs") by addressing the potential pathways through which injected fluids can migrate into USDWs. These programmatic components are described in general below:

Siting: Injection wells are required to be sited to inject into a zone capable of storing the fluid, and to inject below a confining system that is free of known open faults or fractures that could allow upward fluid movement that endangers USDWs.

Area of Review and Corrective Action: The Agency requires examination of both the vertical and horizontal extent of the area that will potentially be influenced by injection and storage activities and identification of all artificial penetrations in the area that may act as conduits for fluid movement into USDWs (e.g., active and abandoned wells) and, as needed, perform corrective action to these open wells (i.e., artificial penetrations).

Well Construction: Injection wells must be constructed using well materials and cements that can withstand injection of fluids over the anticipated life span of the project.

Operation: Injection pressures must be monitored so that fractures that could serve as fluid movement conduits are neither propagated into the layers in which fluids are injected or initiated in the confining systems above.

Mechanical Integrity Testing: The integrity of the injection well system must be monitored at an appropriate frequency to provide assurance that the injection well is operating as intended and is free of significant leaks and fluid movement in the well bore.

Monitoring: Owners or operators must monitor the injection activity using available technologies to verify the location of the injected fluid, the pressure front, and demonstrate that injected fluids are confined to intended storage zones (and, therefore, injection activities are protective of USDWs).

Well Plugging and Post-Injection Site Care: At the end of the injection project, EPA requires injection wells to be plugged in a manner that ensures that these wells will not serve as conduits for future fluid movement into USDWs. Additionally, owners or operators must monitor injection wells to ensure fluids in the storage zone do not pose an endangerment to USDWs.

DOGGR will not be permitting any aspect of the OXY CO_2 Project for the purpose of determining any sequestration credits or accounting. Rather, DOGGR will be permitting the injection of CO_2 for the purpose of EOR. By virtue of the EOR process, the chemistry and physics of EOR naturally results in sequestration of the injected CO_2.[2] Although the Class II permit application for the Oxy CO_2 EOR Project may include certain features relating to the demonstration of sequestration, the inclusion of those features does not alter

[2] *See* Revised Application for Certification for Hydrogen Energy California, Kern County, California, Appendix F (May 2009).

DOGGR's discretionary authority to issue the Class II EOR permit. These features are appropriate for this EOR project to measure and validate permanent CO_2 sequestration for purposes of demonstrating compliance with CEC and PUC expectations for the HECA Project, and to mitigate any risk of environmental impact associated with the two projects.

Existing statutory authority would allow DOGGR to consider these features and develop enforceable criteria to assure safe operation. Specifically, the California Environmental Quality Act ("CEQA") empowers DOGGR to impose additional mitigation measures and/or project design elements to measure and verify the sequestration of CO_2 injected for EOR and to mitigate potential impacts through DOGGR's discretionary permitting authority. [3]

UIC Class II permitting by DOGGR, as supplemented by additional CEQA mitigation measures, represents the most sensible regulatory framework to regulate the injection of CO_2 for purposes of EOR and to verify sequestration given DOGGR's existing regulations for, and expertise in, the injection of fluids for EOR. As described above, the existing regulatory requirements for Class II UIC wells adequately assure the integrity and permanence of CO_2 injected into target formations. Furthermore, Class II has long been used to permit projects injecting CO_2 for purposes of EOR, which is widely recognized as the best platform for the early demonstration of commercial-scale sequestration. United States Environmental Protection Agency ("EPA") guidance further supports DOGGR's authority for regulation of these activities. EOR has historically been permitted under Class II, and EPA has clearly stated that CO_2 injection for EOR will continue to be permitted under Class II despite any additional rulemaking addressing injection wells intended for the exclusive purpose of CO_2 sequestration.[4]

Finally, DOGGR's regulation of CO_2 injection for EOR and sequestration is entirely consistent with the agency's mandate to increase the recovery of oil and gas resources within the state.[5] CO_2 injection for EOR is a proven method for enhancing oil and gas recovery, and CO_2

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[3] *See* Cal. Pub. Res. Code § 21000 *et seq.*

[4] Proposed Rule for Federal Requirements Under the Underground Injection Control Program for Carbon Dioxide Geologic Sequestration Wells, 73 Fed. Reg. 43,492, 43,502 (Jul. 25, 2008) ("CO_2 is currently injected in the U.S. under two well classifications: Class II and Class V experimental technology wells. The requirements in today's proposal, if finalized, would not specifically apply to Class II injection wells or Class V experimental technology injection wells. Class VI requirements would only apply to injection wells specifically permitted for the purpose of GS. Injection of CO_2 for the purposes of enhanced oil and gas recovery (EOR/EGR), as long as any production is occurring, will continue to be permitted under the Class II program.")

[5] *See, e.g.*, Cal. Pub. Res. Code § 3106(a) (establishing DOGGR's environmental protection authority by mandating the supervisor to "supervise the drilling, operation, maintenance, and abandonment of wells … *so as to prevent, as far as possible, damage to life, health, property, and natural resources*….") (emphasis added), § 3106(b) (authorizing DOGGR "to permit the owners or operators of the wells to utilize *all methods and practices known to the oil industry for the purpose of increasing the ultimate recovery of underground hydrocarbons*…. including, but not limited to, the injection of air, gas, water, or other fluids into the productive strata…") (emphasis added), § 3013 (stating that the Oil and Gas division of the PRC "*shall be liberally*

has become a valuable commodity for this purpose resulting in increased demand for CO_2 for EOR. DOGGR's regulation of EOR and sequestration under Class II permitting will facilitate the economical use of CO_2 to advance oil recovery within the state, thus, advancing its mandate.

As a last matter, we acknowledge the concerns raised at our January 12, 2010, meeting that DOGGR's statutory or regulatory authority expressly prohibits the regulation of the OXY CO_2 Project activity as "storage." Although we have researched this issue extensively, we have been unable to find any such legal restriction or prohibition. We surmise that this concern is an negative extrapolation from provisions in the Public Resources Code that empower DOGGR to regulate certain aspects of "storage" of "gas," where "gas" is defined as "hydrocarbons from earth." Assuming so, we offer the following:

1. The activity sought to be permitted is the injection of fluids for the purpose of enhanced recovery of oil and natural gas. This activity is clearly within the defined parameters of UIC Class II, which does not limit the spectrum of fluids injected for such purposes to hydrocarbons.

2. As noted in our attached memorandum, the U.S. Environmental Protection Agency has expressly indicated that the injection of CO_2 for the purpose of EOR, and resulting sequestration, is and will remain regulated by the EPA pursuant to UIC Class II.

3. The CO_2 used for EOR is in a <u>fluid</u>, rather than gaseous, state. The authority regarding gas storage referenced above would not apply to the injection of fluid CO_2 for the purpose of EOR or any other purpose, and certainly does not prohibit such.

4. The injection of CO2 for enhanced recovery of hydrocarbons is an activity DOGGR is expressly authorized to permit. We are aware of no legal principle by which the affirmative authorization to permit one activity (i.e., "storage" of "gas") can create the negative inference that other activities the agency is affirmatively authorized to permit (i.e., the injection of CO_2 fluids for the purpose of EOR) are prohibited. In fact, such an inference would be contrary to the basic principle of statutory interpretation that statutes should be read in harmony so as to give them full effect.

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construed to meet its purposes, and the director and the supervisor, acting with the approval of the director, shall have all powers, including the authority to adopt rules and regulations, which may be necessary to carry out the purposes of this division.") (emphasis added); Cal. Code Regs. Tit. 14, Subchapter 2 (Environmental Protection), § 1779 ("The Supervisor in individual cases may set forth other requirements where justified or called for.")